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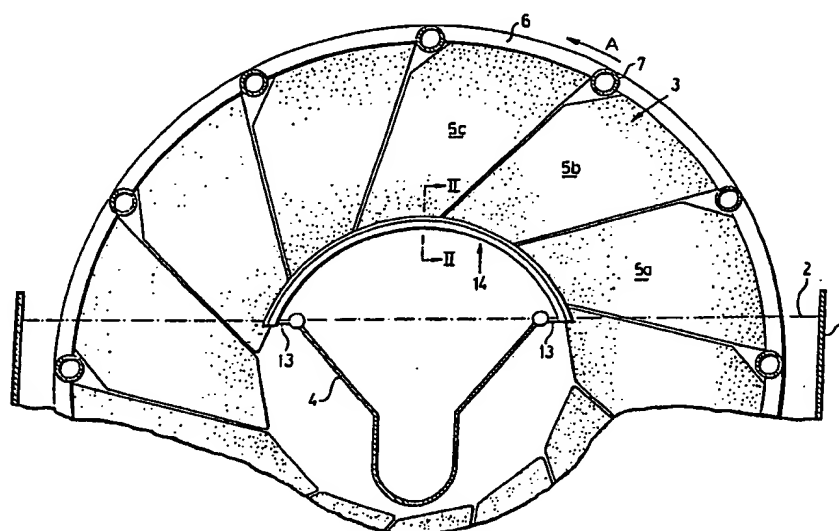
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<p>(21) International Application Number: PCT/SE88/00707 (22) International Filing Date: 27 December 1988 (27.12.88) (71)(72) Applicant and Inventor: NILSSON, Bjarne [SE/SE]; Lanterngatan 9, S-462 00 Vänersborg (SE). (74) Agents: MODIN, Jan et al.; Axel Ehmers Patentbyrå AB, Box 10316, S-100 55 Stockholm (SE). (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FI, FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (Euro- pean patent), SE (European patent), US.</p>		<p>Published <i>With international search report.</i></p>

(54) Title: A DEVICE AT ROTATING FILTERS



(57) Abstract

A device for preventing re-wetting of thickened suspension in a filter of the type where a plurality of rotatable, axially spaced annular filter disks (3) are partially submerged in a container (1) for suspension, and where a collection trough (4) extends centrally through the filter disks (3) for collecting thickened suspension falling therefrom. Each filter disk comprises a plurality of filter sections (5) and each filter section is connected to a filtrate duct (7) situated at the circumference of the disk. At each filter disk (3) is arranged an arcuated channel (14) extending outside of the edges of the collection trough (4) such that filtrate flowing from a filter disk (3) is guided past the collection trough (4) and down into the suspension container (1).

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A DEVICE AT ROTATING FILTERS

The present invention relates to a device for preventing re-wetting of thickened suspension in a filter of the type where a plurality of rotatable, annular filter disks arranged axially one after the other are partially submerged in a container for the suspension, and where a collection trough centrally extends through the filter disks for collecting thickened suspension falling therefrom, each filter disk comprising a plurality of filter sections and each filter section being connected to a filtrate duct situated at the circumference of the disk.

In a filter of this type, a filtrate duct is connected to vacuum when the associated filter section moves under the suspension surface, as well as during a certain portion of its movement above the suspension surface, thereby to suck up excess liquid from the filter cake deposited on the filter section. In order that the filter cake will loosen from the filter section this vacuum connection is inhibited when the section is in the area above the collection trough. An often prevailing problem occurs here, namely that filtrate, which has not yet had time to leave the filter section, runs out of the section and down into the collection trough where it re-wets the relatively dry filter cake.

The object to the invention is to provide a device which simply and relyably removes the re-wetting problem described above. This has been achieved by the invention having been given the distinguishing features disclosed in the following claims.

The invention is described in the following with reference to the accompanying drawings, on which figure 1 is a schematic cross-section through a disk filter which is provided

with a fixed device for preventing re-wetting according to the present invention, figure 2 is a section to a larger scale along the line II-II in figure 1, figure 3 is a cross-section similar to the one in figure 1 through a disk filter which is provided with a device preventing re-wetting in accordance with the present invention, said device rotating with the disk filter, and figure 4 is a section to a larger scale along the line IV-IV in figure 3.

In figures 1 and 3 there is depicted a container 1 for suspension which is to be filtered, and the surface of the suspension is denoted by the numeral 2. A plurality of annular filter disks are partially submerged in the suspension, these disks being mounted axially one after the other for rotation in the direction of the arrow A, one of the disks 3 being illustrated in the figures. A collection trough 4 extends through all the filter disks 3. The filter disk 3 comprises a plurality of filter sections 5, which are carried by an annular frame structure 6. Filtrate ducts 7 extend in an axial direction between all the filter disks 3 included in the filter. The ducts 7, which communicate with the interior of a filter section in each disk in a manner not more closely illustrated, are also in communication at one end of the filter with a means which establishes a subpressure in the filtrate ducts 7 according to a pre-determined program, when the associated filter sections are below the suspension surface 2, said means also maintaining the subpressure until the sections are in the area above the collection trough 4.

As will be seen from figures 2 and 4, the filter sections 5 in this example are of the type comprising two mutually spaced fluid tight layers 8 and 9 and a filter means spaced from these layers, e.g. in the form of a screening cloth 10.

There are openings 11 in the fluid tight layers 8 and 9, so that liquid filtered through the screening cloth 10 can be sucked into the interior of the filter section, which is in communication with an axial filtrate duct 7. In the illustrated example there is also an opening 12 in the radially inward end of the filter section 5.

Three filter sections are denoted by 5a, 5b and 5c in figures 1 and 3. In the rotational position assumed by the section 5a there is still subpressure in the associated filtrate duct 7, and the filtrate can flow from the interior of the section 5a to the duct 7. Approximately in the position assumed by the section 5b, the subpressure ceases in the filtrate duct 7 and thereby in the interior of the section 5b, whereafter, approximately in the position assumed by section 5c the process of removing the filter cake deposited on the section is begun by spraying the filter cake with a water jet. As will be seen, the filtrate from the sections 5b and 5c can no longer reach the ducts 7, but run radially inwardly in the respective section and leave the section to be received in the collection trough 4, where this filtrate undesirably causes re-wetting of the relatively dry product already there.

In order to prevent such re-wetting, according to the present invention there is provided a channel receiving filtrate flowing down from the sections 5, otherwise be collected in the collection trough 4, leading it past the collection trough and down into the container 1.

In figures 1 and 2 there is illustrated a first embodiment example of a device in accordance with the present invention. In this embodiment an arcuate channel 14 is attached with the aid of struts between the edges of the collection trough 4 and the inner circumference of the filter disk 3.

The channel 14 suitably has a U-shaped cross-section with a bottom 15 and side walls 16 and 17. The side walls 16 and 17 preferably extend with a space between them and the filter cloth 10 upwards a distance along the sides of the sections 5, as illustrated in figure 2. The ends of the channel 14 terminate outside the edges of the collection trough 4, so that filtrate flowing in the channel is guided outside the trough 4 and down into the container 1.

In figures 3 and 4 there is illustrated an embodiment of the invention in which an annular channel 14' is arranged inside each filter disk 3 for rotation with the disk. The side walls 16' and 17' of the channel 14 have been bent inwards so that the channel engages against the section 5, as illustrated in figure 4. The bending can be arranged such that the side walls keep the channel to the sections by spring action. Alternatively, non-illustrated struts can attach the channel 14' to the frame structure 6 and/or to the filtrate ducts 7.

As will be seen, both the arcuate channel 14 according to figure 1 and the annular channel 14' according to figure 3 are concentric with the filter disk 3. Although it is preferred to permit the annular channel 14' to rotate with the filter disk 3, it can also be conceived as being ridgedly attached, similar to the arcuate channel 14. However, in the rotating case there is achieved the advantage that the channel is continuously flushed during passage through the suspension.

The annular channel 14' according to figure 3 can advantageously be made up from arcuate, mutually assemblable and separately removable sections, each including an angle of, for example, 180°, 120°, 90° or less. Hereby the exchange of individual filter sections 5 is facilitated.

If the free edges of the side walls 16 and 17 or 16' and 17' are folded over, it is suitable that this folding is done inwardly according to figure 3, so that on the outside are no sharp edges on which fibres and the like can catch.

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As will be clear from the above description the invention solves in a simple way the re-wetting problem mentioned in the introduction, by catching filtrate flowing from the sections of a filter disk and leading the filtrate outside the collection trough down into the suspension container.

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C L A I M S

1. A device for preventing re-wetting of thickened
suspension in a filter of the type where a plurality of
5 rotatably axially spaced annular filter disks (3) are
partially submerged in a container (1) for the suspension,
and where a collection trough (4) extends centrally through
the filter disks (3) for collecting thickened suspension
falling therefrom, each filter disk comprising a plurality
10 of filter sections (5) and each filter section being
connected to a filtrate duct (7) situated at the circum-
ference of the disk,
c h a r a c t e r i z e d i n that at each filter disk is
arranged an arcuate channel (14;14') substantially
15 conforming to the inner circumference of the filter disk
(3), the chord of the channel being at least equal to the
width of the collection trough (4).

2. A device as claimed in claim 1,
20 c h a r a c t e r i z e d i n that the channel (14,14')
has an arcuate shape and is concentric with a filter disk
(3).

3. A device as claimed in claim 1 or 2,
25 c h a r a c t e r i z e d i n that the channel (14,14')
has a width exceeding the thickness of a filter disk (3) at
the inner circumference thereof.

4. A device as claimed in claim 1, 2 or 3,
30 c h a r a c t e r i z e d i n that the channel (14,14')
has side walls (16,17) extending upwards along a portion of
the sides of a filter disk (3) close to the inner circum-
ference thereof.

5. A device as claimed in anyone of the preceding claims, characterized in that the channel (14,14') is rigidly mounted on the carcass of the filter such as to be immovable relative to a filter disk (3).

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6. A device as claimed in claim 5, characterized in that the channel is fixed in the collection trough (4).

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7. A device as claimed in anyone of claims 1-4, the channel (14') being annular, characterized in that the channel (14') is rotatable with a filter disk (3).

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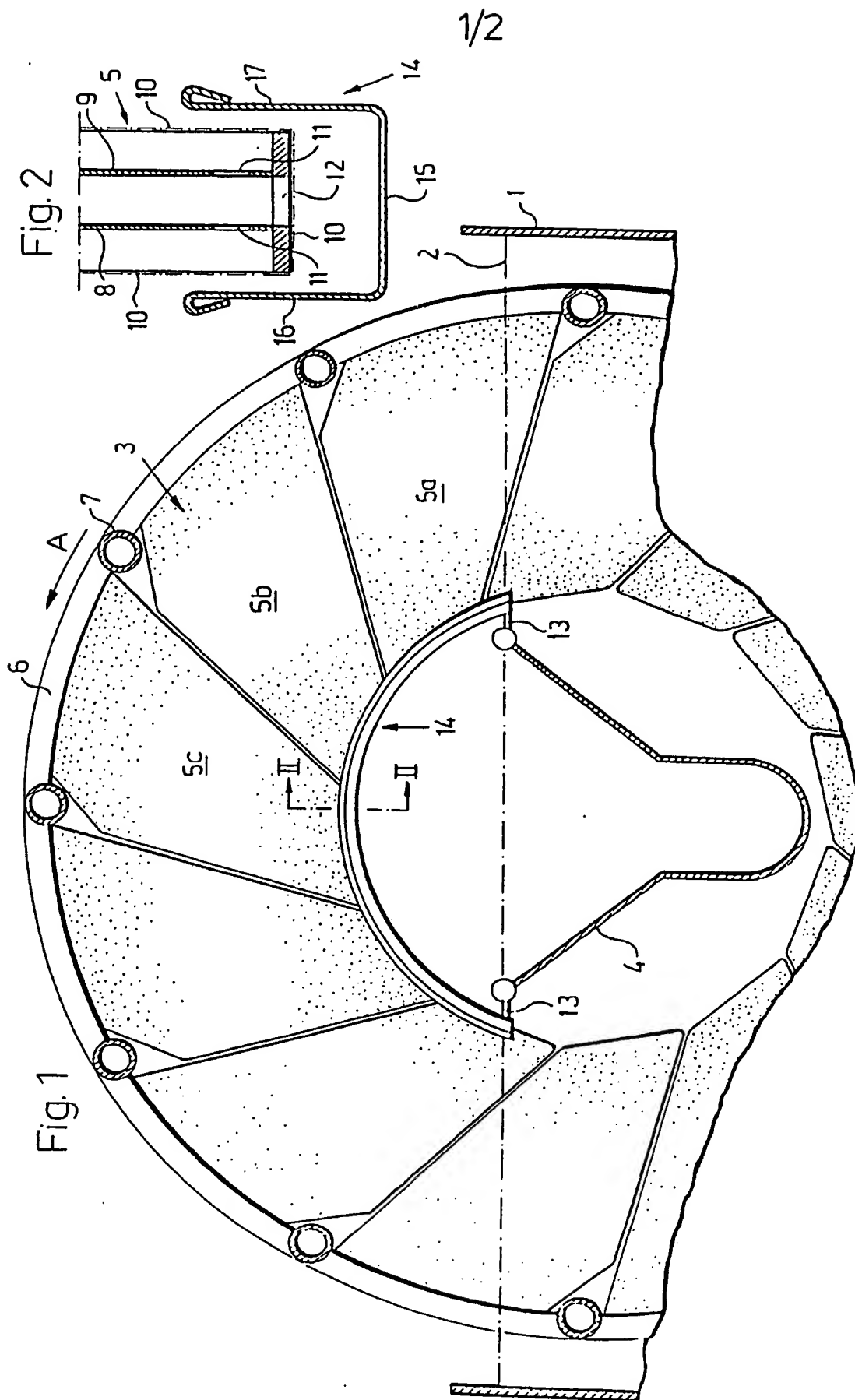
8. A device as claimed in claim 7, characterized in that the side walls (16,17) of the channel (14') press against the sides of a filter disk (3).

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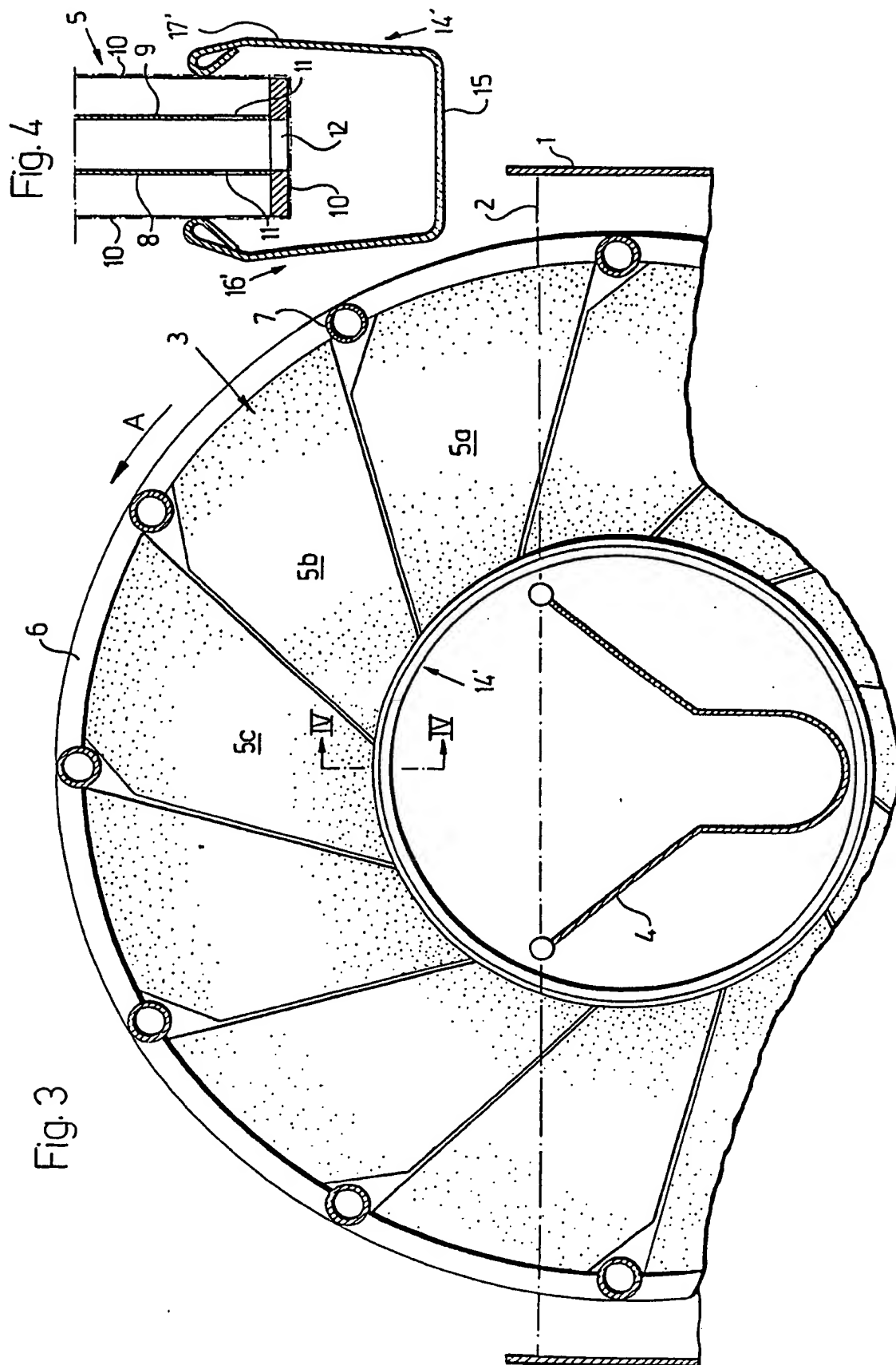
9. A device as claimed in claim 7, characterized in that the channel (14') is mounted in a frame structure (6,7) or the like, carrying a filter disk (3).

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10. A device as claimed in claim 7, 8 or 9, characterized in that the channel (14') is manufactured in assemblable arcuate sections.

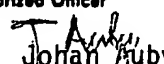
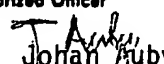
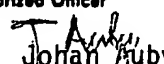


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INTERNATIONAL SEARCH REPORT

International Application No PCT/SE88/00707

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁸ According to International Patent Classification (IPC) or to both National Classification and IPC ⁴ <div style="margin-top: 10px;">B 01 D 33/26</div>										
II. FIELDS SEARCHED <div style="text-align: center; margin-top: 10px;">Minimum Documentation Searched ⁷</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; border-bottom: 1px solid black;">Classification System ¹</td> <td style="border-bottom: 1px solid black;">Classification Symbols</td> </tr> <tr> <td>IPC 4</td> <td>B 01 D 33/26, 33/38</td> </tr> <tr> <td>US C1</td> <td>210: 327, 330, 331, 346, 347, 486, 487</td> </tr> </table> <div style="text-align: center; margin-top: 10px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁶</div> <div style="margin-top: 20px;">SE, NO, DK, FI classes as above</div>			Classification System ¹	Classification Symbols	IPC 4	B 01 D 33/26, 33/38	US C1	210: 327, 330, 331, 346, 347, 486, 487		
Classification System ¹	Classification Symbols									
IPC 4	B 01 D 33/26, 33/38									
US C1	210: 327, 330, 331, 346, 347, 486, 487									
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹ <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category ⁸</th> <th style="width: 70%; border-bottom: 1px solid black;">Citation of Document, ¹¹ with Indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 20%; border-bottom: 1px solid black;">Relevant to Claim No. ¹³</th> </tr> <tr> <td style="vertical-align: top; padding: 10px;">E</td> <td style="vertical-align: top; padding: 10px;">SE, A, 8702468-3 (NILSSON BJARNE) 27 December 1988</td> <td style="vertical-align: top; padding: 10px;">1-10</td> </tr> </table> <div style="margin-top: 20px;"> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>¹⁰ Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div> </div>			Category ⁸	Citation of Document, ¹¹ with Indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	E	SE, A, 8702468-3 (NILSSON BJARNE) 27 December 1988	1-10		
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IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black;">Date of the Actual Completion of the International Search</td> <td style="width: 50%; border-bottom: 1px solid black;">Date of Mailing of this International Search Report</td> </tr> <tr> <td style="border-bottom: 1px solid black;">1989-07-03</td> <td style="border-bottom: 1px solid black;">1989 -07- 0 7</td> </tr> <tr> <td style="border-bottom: 1px solid black;">International Searching Authority</td> <td style="border-bottom: 1px solid black;">Signature of Authorized Officer</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Swedish Patent Office</td> <td style="border-bottom: 1px solid black;"> <div style="text-align: center;">  Johan Raby </div> </td> </tr> </table>			Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	1989-07-03	1989 -07- 0 7	International Searching Authority	Signature of Authorized Officer	Swedish Patent Office	<div style="text-align: center;">  Johan Raby </div>
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